ABSTRACT

LIQUID-CRISTAL DISPLAY (VARIANTS) AND THE METHOD OF ITS FABRICATION

Invention is related to the area of electronics and can be used for making information displays and, in particular, liquid crystal (LC) indicators, screens, panels etc.

The drawback of the majority of liquid-crystal displays is a strong dependence of their transmission on the angle of light incidence and, as a result, decrease of contrast and even inversion of transmission levels at some observation angles. For improving these characteristics of displays in many cases a set of retardation plates is used, which increases the cost of the device and does not resolve the problem of color inversion.

The most promising from this point of view are multi-domain LC displays, in which within a single pixel there are areas with various orientations of the liquid crystal in the plane of substrates.

Present invention is aimed to make displays with wide viewing angle possessing higher brightness in transmission mode and to develop more simple method for making such displays. This target is achieved by making in display with multiple pixels deflecting elements (5), (6) of dielectric material and depositing them over the electric conductive coating at least on one of the substrates (1), (2) the space between which is occupied by liquid crystal. Dielectric elements can have profile as from the liquid crystal side, so from the side of the substrate.

Dielectric deflecting elements (5), (6) may be displaced along the perimeter of the pixel as well as across its area. After applying electric voltage to the electrodes (3) at the opposite substrates (1), (2) at the interface LC-dielectric deflecting element distortions of the electric field arise with the component of electric field parallel to the substrates. Direction of this in-plane component is determined by the configuration of the dielectric deflecting elements (5), (6). The value of this component is sufficient to reorient liquid crystal in different directions and hence to generate different domains within the pixel area and to make optical properties of display independent of the viewing angle. Dielectric elements (5), (6) take not more than 5-10% of the

pixel area and proposed display has higher brightness. At the same time configuration of the dielectric elements (5), (6) is capable of obtaining two- as well as four domain displays for any real pixel shape.

So we can summarize, that using conventional technology for making LC displays, in which only one technological photolithographic stage is added for making deflecting dielectric elements (5), (6), it is easy to obtain display with wide viewing angle. The number of domains, their displacements, as well as proportion of their areas can be easily varied by varying photolithographically made pattern. Besides this, in transmission mode the losses of light are in the range of 10-20% in comparison with conventional single-domain displays, which are not essential for the desk-top displays.